

# Cost management aimed at value: In search of a comprehensive model

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## INTRODUCTION

Quality, as part of real value, has at its root the universal idea of inspiration, delight and beauty and integrated into these aspects are the main functions of architecture:

- ❖ Functionality
- ❖ Structural stability
- ❖ Aesthetics

or in architectural terms, referring to the functions according to Vitruvius (Van Pelt & Westfall, 1991:177-180):

- ❖ Commodity
- ❖ Firmness
- ❖ Delight

If these functions are in harmony, the architectural object will captivate, motivate and inspire

Through the ages, this has been achieved in many locations throughout the world and today those buildings and structures still evoke amazement

The question may then be asked: "How does one deal with the realities of budgets, price-cuts and control in a creative manner?"

## THE VALUE CONCEPT

Prior to any debate on the management and assurance of quality or ways and means of creating quality products of real value, 'quality products' require definition. Quality has been defined as:

"... the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied need" (Ashford, 1989:193). This definition may equally satisfy the definition for products of value

Therefore, (architectural) quality must not only be expressed in physical and functional terms, but quality products must also adhere to the requirements of beauty, form and ambience. The psychological needs of the market must be addressed. "The purpose of a building is to provide shelter; the purpose of architecture is to inspire" (Ashford, 1989:12). Economic value related to price, return, maintenance, running costs etc. must, however, also be accounted for

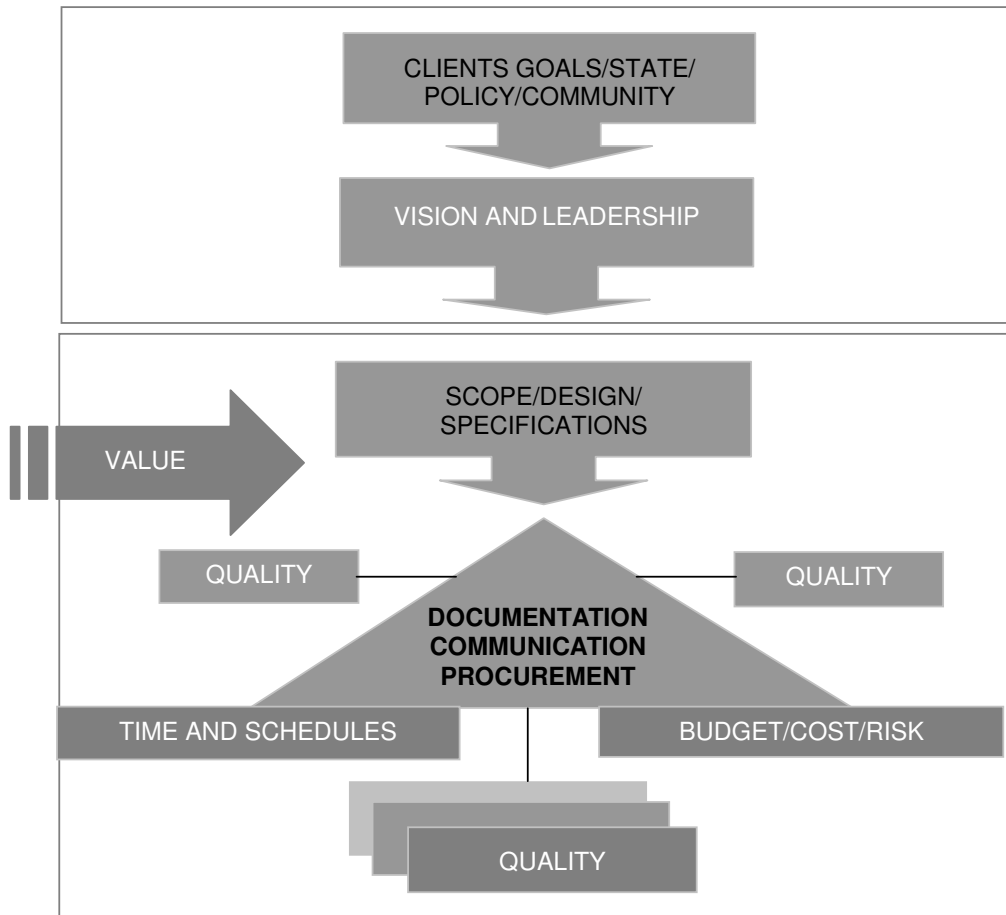
The value of a building or structure, therefore, may depend on a number of factors, viz. That the:

- ❖ Product standard or specification properly defines fitness for purpose
- ❖ Product is produced to the specifications
- ❖ Product is delivered on site according to standards set in terms of expected performance (including price)
- ❖ Design of the building explicitly combines all its elements and components to ensure effective performance of the whole, including economic viability and return
- ❖ Building work complies with the designers' instructions
- ❖ Design adheres to the needs of users of the building facilities
- ❖ Building stands to enhance and blend in with the environment (Fletcher & Scivyer, 1987:369)

## THE DETERMINANTS OF QUALITY AND VALUE

Quality and long term value are not functions but products of strategies, tactics, decisions and of sound management. Elements of effective management of design, scope, specification,

documentation, cost, budgets and time are illustrated in *Figure 1*. A model to achieve long term value may therefore contribute to project value and success



**Figure 1. Management of a successful project.**

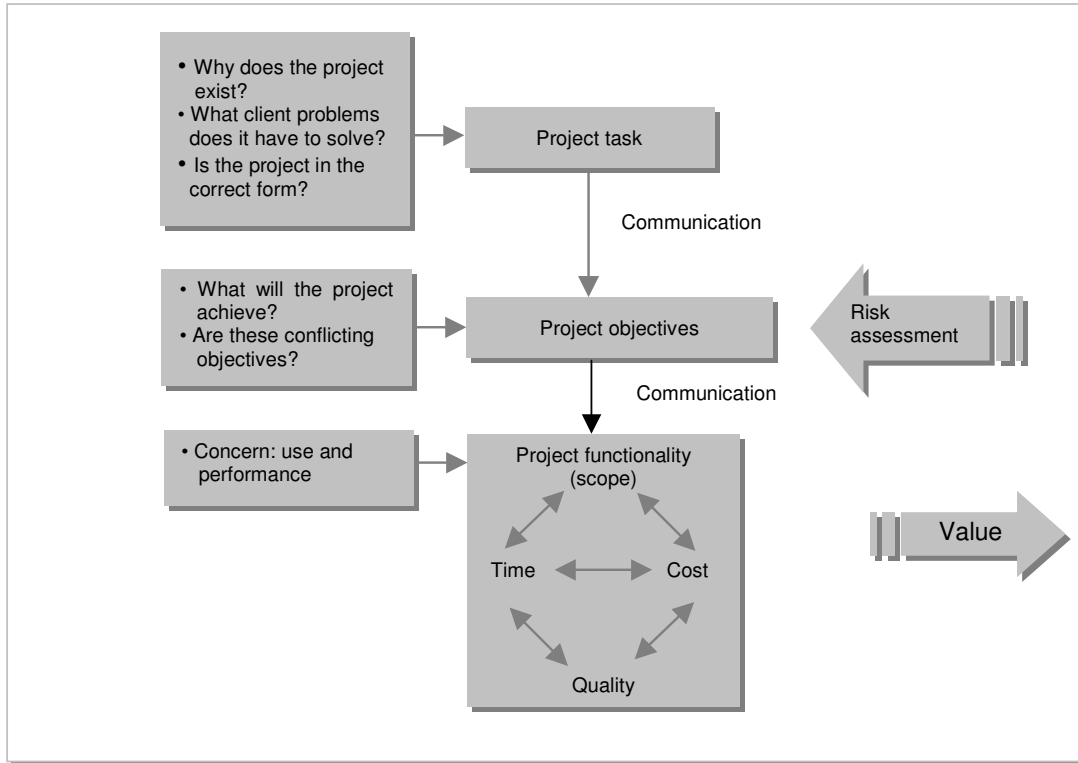
A project is successful when completed within budget, on time, and to the owners' satisfaction.

From inception to the completion of a project, each function must be aimed at the achievement of quality and value whether the function is design, specification, documentation, price or procurement. Furthermore, the element of competition and what it purports to achieve, must not be forgotten

The traditional approach to competitive tendering involves the calling of tenders to be addressed to a principal, for work and/or the supply of goods in return for specified payment. In the evaluation of the tenders, the principal will seek a tender that best suits the specific requirements of price, time and quality. From time to time, other criteria may also apply. In recent South African experience, tenders submitted to various state bodies might also be evaluated on the basis of:

- ❖ Affirmative action
- ❖ Training
- ❖ Labour content
- ❖ Local materials
- ❖ Community involvement (Twyford, 1998:343-345)

The appointment of professionals may also be classified as 'competitive' as the consultant team should be able to produce a product, meeting standard levels of acceptability, manage the process and motivate the contractor to achieve the highest levels of quality (Figure 2)



**Figure 2** Context of projects (Kelly & Male 1993:83)

Taking the foregoing into account, the generation of quality products is influenced by the following determinants:

- ❖ Budgets
- ❖ Development cost plans
- ❖ Design and design management
- ❖ Specification
- ❖ Documentation (Procurement etc.)
- ❖ Communication systems
- ❖ Total cost management and control
- ❖ Time scheduling and time management

Quality is inherent in each of these processes which should not be reactive, but dynamic and proactive

At the risk of subordinating the purposes and interests of those who use and live in buildings, professionals, consultants, developers and contractors must realise the needs of the market, the people and the community they serve. The danger is that through "conceptual frameworks we risk isolating fragments of social reality, decontextualising, then recontextualising and, in so doing, create a different kind of world" (Shammas-Toma, Seymour, Clark, 1998:177-192)

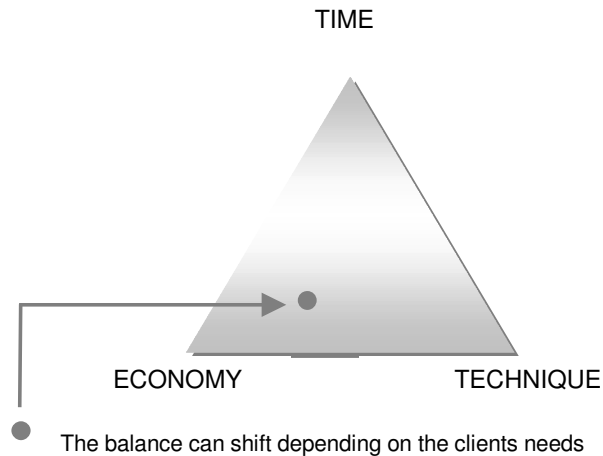
In the the final analysis, value can only be achieved in a specific context, within a specific environment, for a real community. A comprehensive cost management model should therefore also include these aspects

### THE BALANCE OF FUNCTIONS

Unfortunately, resources are usually not plentiful and humans are not perfect. It is argued that quality is not absolute, but relative to the functions of quality. The major determinants of quality are time, scope and cost, where time embraces scheduling, time planning, management and control, while scope includes design, brief, specifications, planning and management. Cost refers to price,

economy, cost design, price planning, -control and budgeting. (See Nilsson (NORDNET) 1997:1). Only if all the above is in balance is real value the result

Once this balance has been determined, project planning may continue and the results documented, to procure a contractor who can deliver the product to the pre-determined standard. The contractor may, however, also form part of the quality planning team, depending on the system used. While this may be considered idealistic, potential success lies in the way the team members approach their goals (see Figure 3). The question may be asked: how does this approach influence long term value?



**Figure 3 Economy: one of the three quality parameters in the project triangle relative to the value balance. (Nilsson, 1997:1)**

## APPLICATIONS

In the context of the construction industry, certain role-players and stakeholders affect the success-balance in the following areas of project development

- ❖ Client: the aims, purpose and location of project
- ❖ Designers: the design and specification. "The designer is tasked to produce the 'best' design out of many alternatives, i.e. the 'what', but cannot ignore the 'why', i.e. the overall worth or value of the project. Thus, both technical procedures and evaluation procedures are needed. The latter comprise both economic analyses, typically of the classic investment appraisal type and decision-making techniques" (Summers, Boxtton & Stephenson, 1998:42)
- ❖ Cost engineers and quantity surveyors: cost design, cost- or price planning, forecasting, cost control, cost assessment and budgeting; for effective cost design, cost planning and -control, it is essential that the cost professionals work in close co-operation with the owner and design consultants. It happens more often than not, that the budget guides the outcome of a project thus stressing the importance of cost design (design of space in economic terms)
- ❖ Communities: community interests and the environment
- ❖ Manufacturers: materials and components supplies
- ❖ Contractors and sub-contractors: construction and testing
- ❖ Users: use of the finished structures and their subsequent repair and maintenance (Gunning, 1987:376-378)

## THE CONSTRUCTION INDUSTRY, THE CONTRACTOR AND VALUE

Although the principles of producing quality products are universal, it must be realised that the construction industry differs in many aspects from other manufacturing industries

Differences between factory and construction site cannot be ignored. There are special factors which have to be taken into account, for example:

- ❖ Susceptibility to weather
- ❖ Mobility of labour
- ❖ Uniqueness of projects

These realities undoubtedly make the introduction of value management difficult in comparison with other industries, where stricter control of production processes is more defined

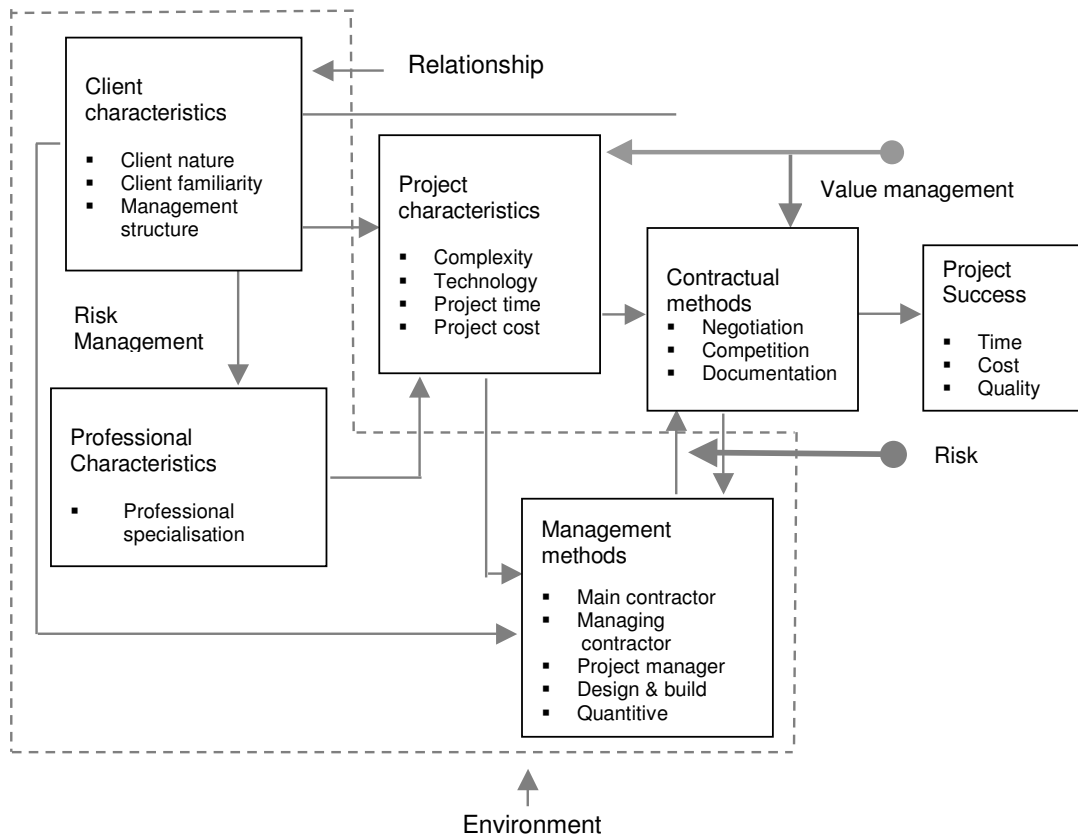
Knowledge of the differences between construction projects and manufactured products assists the professional responsible for value and quality management, quality assessment and quality control in producing a project approaching the required standards

In greater detail, these are the following:

- ❖ Most building projects are unique
- ❖ A building site is unique in terms of environment and conditions
- ❖ The lifecycle of a building project from inception to completion is longer than that of most manufactured products, and a building continues to evolve throughout its long life cycle in terms of both time and circumstance
- ❖ The mobility of design and construction staff makes production difficult to control
- ❖ There are few clearly evolved, tested and precise standards for the evaluation of overall design and construction quality
- ❖ Participants in the design and construction processes are usually different from project to project
- ❖ Feedback from the users of buildings to designers may be remote from the actual time of design and construction
- ❖ Conflicting costing systems exist between design/construction processes and maintenance expenditure. Without the unification or compatibility of these two stages, real value cannot be assessed
- ❖ The respective role of communities and the environment are becoming more important in the development of new projects
- ❖ There is a lack of integrated action between designers and builders
- ❖ The diverse delegation of responsibility for supervision work on construction sites (see Dalton, 1987:363)

## PROCUREMENT

Various types of procurement systems in the construction industry have also evolved and in recent years, a trend towards innovation in contract administration has developed. These phenomena have been caused by extensive failures in past projects. Major disappointments in project performance were caused by extensive delays in planned schedules, cost overruns, serious problems associated with quality assurance and an increased number of claims and litigation proceedings. The consumer (the public) does not obtain the best product for money (Herbsman, Ellis, 1991:150; Naoum & Langford, 1987:45) (*Figure 4*)



**Figure 4 Construction project: characteristics, relationships, contracts & management**  
(Naoum & Langford, 1987:45)

It is a known fact that problems related to cost, scope and time exist in the construction industry in South Africa, and these should be examined in strategic terms, assessing the aims, goals and value systems of the industry and its allied professions

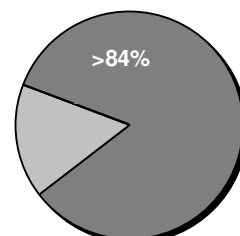
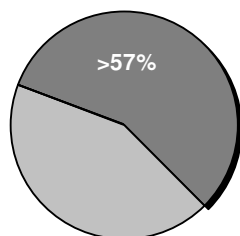
The following results from recent studies in the UK and RSA show initial results in respect of procurement preference (QS to client or contractor). Remembering that the UK industry is "recovering" from the Latham report "reaction", the following questions were asked:

**ON WHAT PROPORTION DO CONSULTANTS (QS) STILL MEASURE AS PART OF PROCUREMENT**

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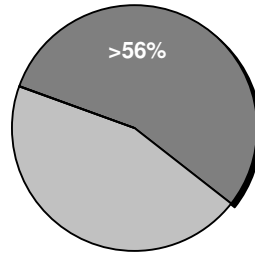
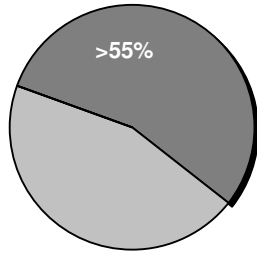
Measure as part of procurement



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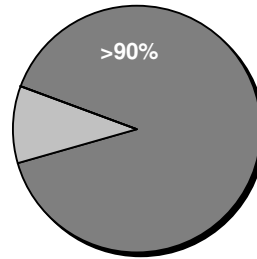
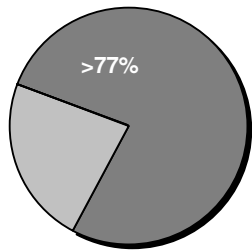
**Approximate quantities where measurement is not carried out**



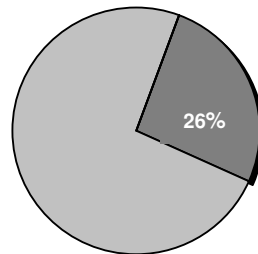
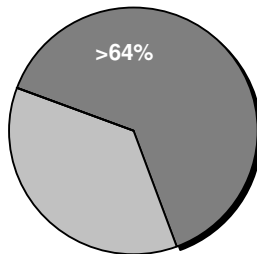
SMM7

**Method of measurement**

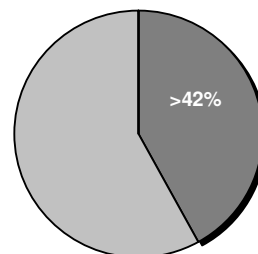
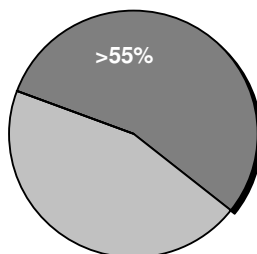
SSM6



**Tender sum analyses by contractor. Breakdown on D + B**



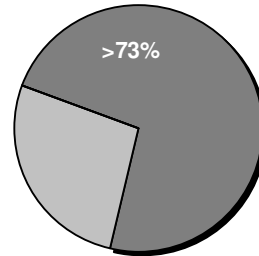
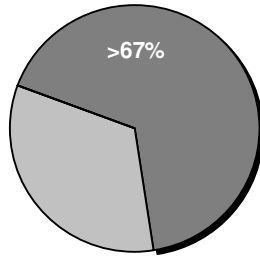
**Tender sum analyses through elements or SMM7/SSM6: Where analysed**



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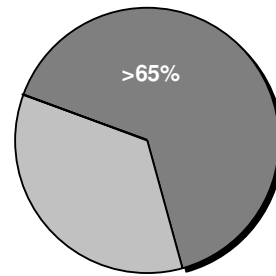
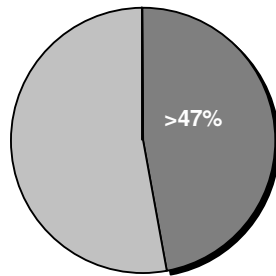
**Computer systems for bill production**



**Quantities for contractors: Method of measurement: SMM7 or SSM6**

**SMM7 or own**

**SSM6 or own**



**(RICS, 2002)**

**(ASAQS, 2003)**

The above responses show that measurement is still preferred, to a large extent, as an important part of procurement systems. Procurement will form an important part of a comprehensive model.

**BARRIERS TO QUALITY**

Numerous barriers militate against achieving quality in the products of construction processes, even if it is accepted that quality standards relate to function

The following role players are most relevant:

**Owners.** Returns within specific time frames are critical and developers often sell projects within a short period of time. Long-term commitment is therefore not always present

**Designers.** Designers are compelled to adhere to the pressures of budgets, returns, local conditions, the likes and dislikes of communities and fashion in the market place

**Cost management professionals.** Budgets and finances force cost professionals to advise on alternatives, procurement methods, documentation and systems that do not always promote value

**Contractors.** Contractors are responsible for generating standards of workmanship embodied in specifications, sometimes within extremely tight time constraints. Generally, their ability to deliver this undertaking is taken on trust. In practice, each project will be tackled by a new management team, even if previous contractors are appointed. Also, almost inevitably, different subcontractors and operatives will materialise on site. Studies have shown that the final result is as much the outcome of a zealous agent, resident engineer or clerk of works as would arise from details in respective project specifications. The final demonstration of quality is the absence or presence of defects in the medium and long term (see Bishop, 1987:24)



## STEPS TO QUALITY

It is very important to apply steps to quality and value during project planning and construction. These steps emanate from a combination of strategic approach and value system, which needs to be designed. These steps may be:

**Knowing the customer.** Who are the customers? What (and why?) are they developing?

**Knowing the assignment.** The assignment or brief should be identified clearly. The assignment must also be defined and be quantifiable

**Dividing and conquering.** Divide the work and conquer it through success. The work must be divided into smaller units that facilitate more accurate measurement

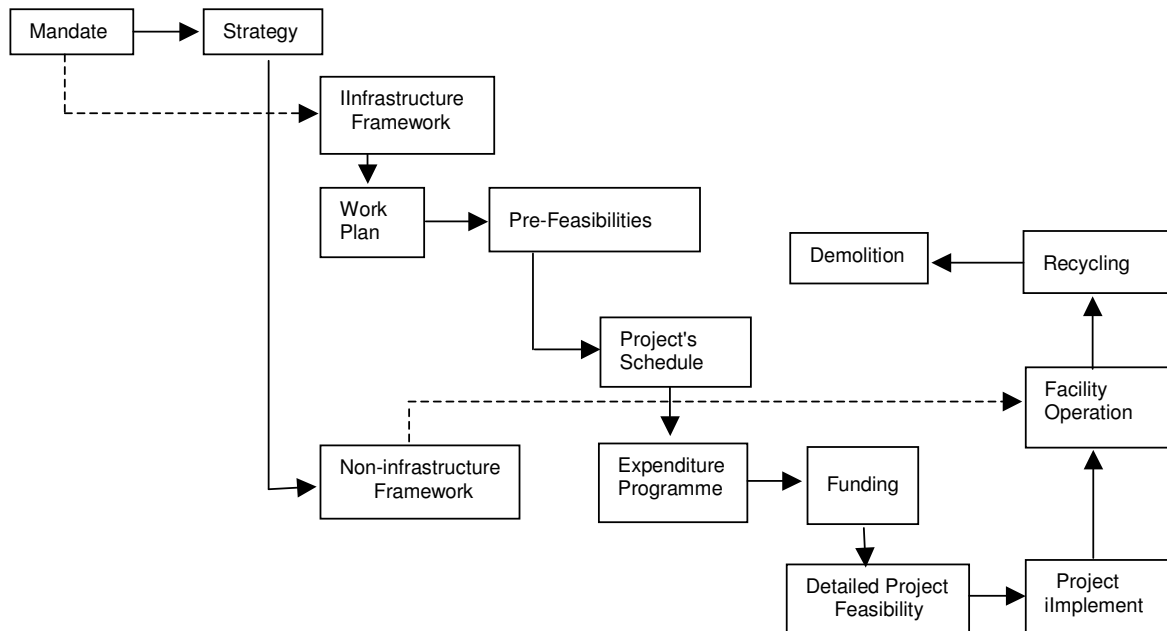
**Frequent reviews.** Internal and external sessions in respect of process, goals, inspections, audits, etc.

**Putting the team in control.** The team must make decisions. 'Successful teams' are willing teams; willing to be assessed and have their work reviewed. (see Dillard, 1997)

Teamwork and proactive team co-ordination are essential to the success of a project. Through a team-directed approach, the foregoing steps become a logical part of the design, planning and construction process

The experience and knowledge base of the team that executes a project are also very important in ensuring that project results are what is expected by the client and the community, and that projects adhere to the quality standards set by the team itself

Before the functions and techniques to project value are discussed, the draft "Built Environment Life Cycle" as proposed by the Council for the Built Environment (S.A.), might assist in evaluating future tendencies



**Figure 5.** (Council for the Built Environment (S.A.). Identification of Work, 2003:16)

Although flawed, Figure 5 shows the thinking of this important body

The above should however include the following:

- ❖ Viability analysis
- ❖ Risk profiling
- ❖ Fundability
- ❖ Gearing
- ❖ Price planning/control
- ❖ Investment analysis
- ❖ Plan of work structuring

### TECHNIQUES AND FUNCTION TO ACHIEVE PROJECT ECONOMY

The utilisation and management of capital allocated to a specific project is essential to achieving successful quality standards. Sound cost management systems and procedures must be implemented to ensure that the best quality, scope and specification for specific projects related to pre-set budgets, are realised

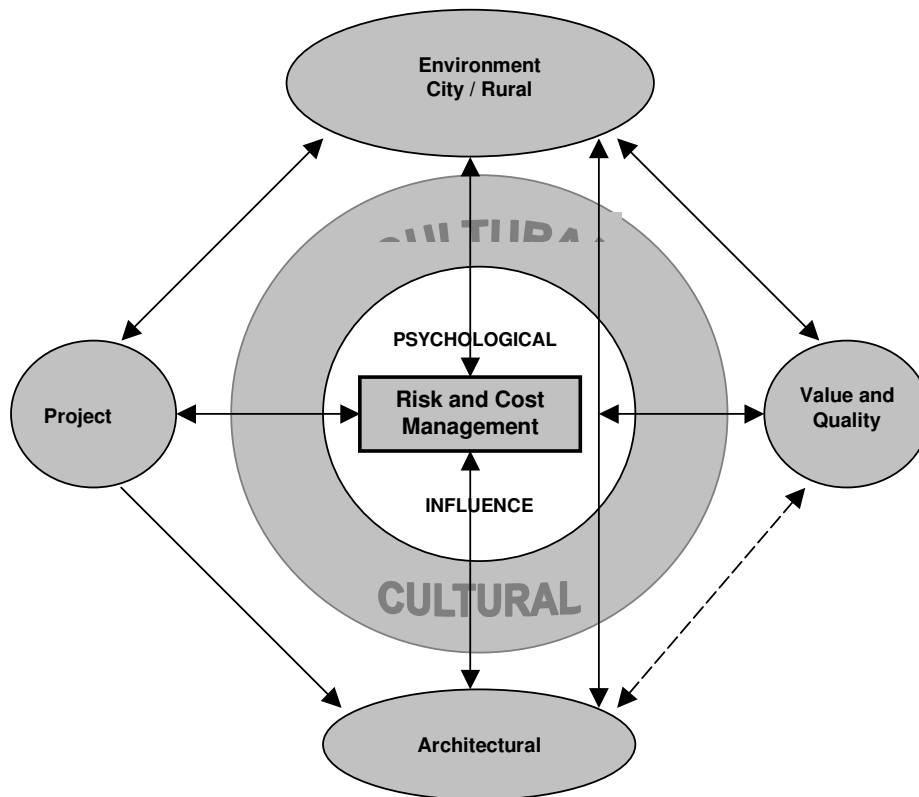
The role of the cost engineer and/or quantity surveyor is vital, regarding cost management in construction projects

The following techniques will assist in achieving project economy:

- ❖ Value management and engineering
- ❖ Viability calculations
- ❖ Advice on investment alternatives
- ❖ Cost benefit analysis
- ❖ Cost design
- ❖ Price (cost) planning
- ❖ Price (cost) control
- ❖ Life cycle costing (whole life appraisal)
- ❖ Net present value analysis
- ❖ Cash flow predictions
- ❖ Valuation/market assessment
- ❖ Cost reporting (see Nilsson, NORDNET, 1997)

### RISK AND COST ELEMENTS

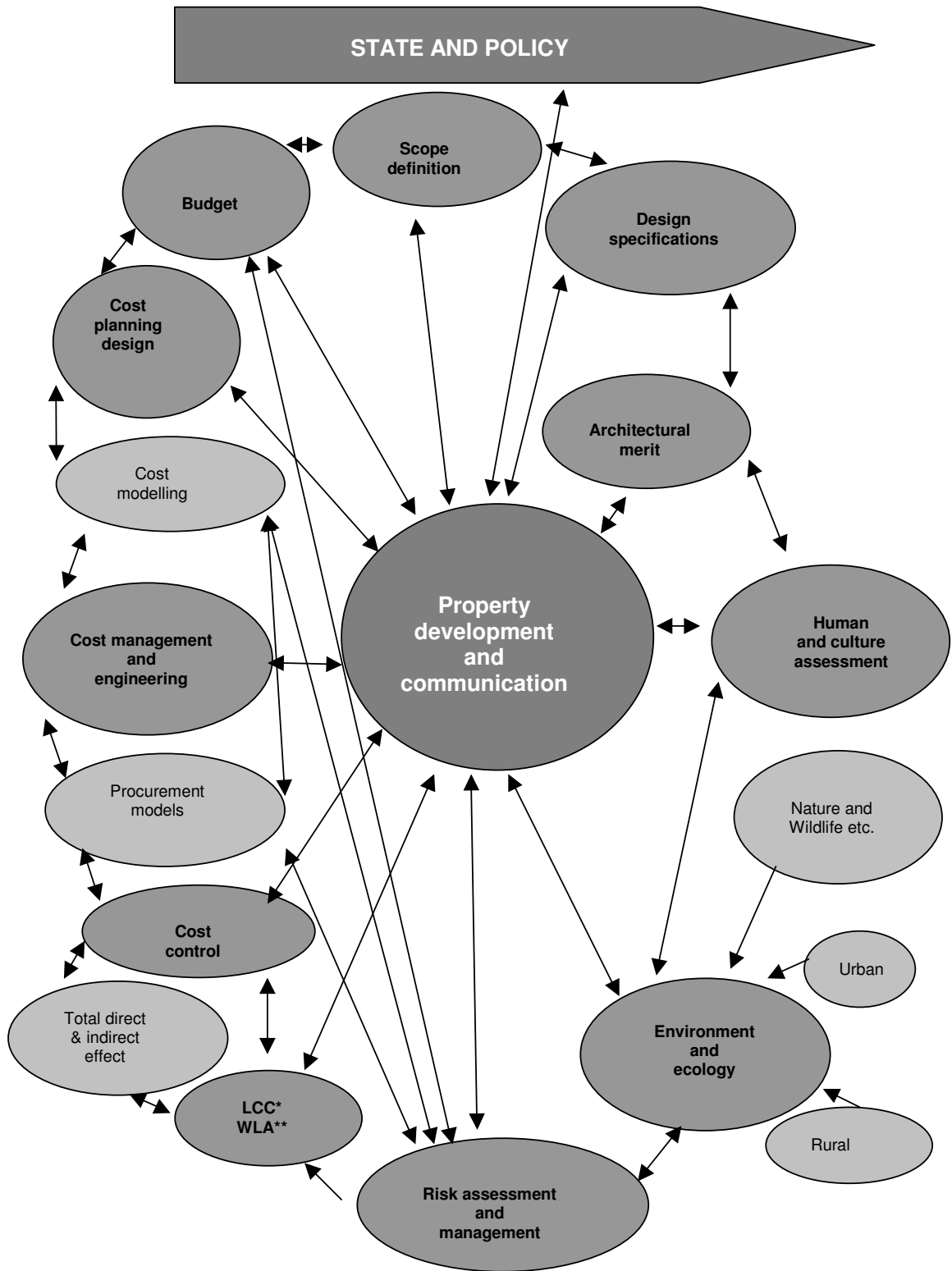
The following diagram shows the main elements related to risks, budget, cost, price, environment and architecture, that needs to be accounted for before a model can be designed. Once these elements are taken into account, a model showing the relevant techniques and their interaction may then be proposed.



**Figure 6** The main elements of risk, budget and cost

**THE PROPOSED MODEL: ELEMENTS**

The proposed model (Figure 7) takes the functions, techniques, influences and environment into consideration, showing the elements and various possible links and interaction needed for project success.



\* LCC – Life cycle costs  
 \*\* WLA: Whole life appraisal

**Figure 7** The model: Elements

## A VIEW OF THE QUANTITY SURVEYING PROFESSION

It may be helpful to now compare the functions and elements of the proposed model with the expected services or outcomes that the Quantity Surveying profession believes it should be able to offer the market. Below is a comparison, between the South African situation and the Pacific Association of Quantity Surveyors (PAQS), of the registered basic outcomes or competencies at entry level, that a quantity surveyor should possess.

SOUTH AFRICA	PACIFIC ASSOCIATION
<b>Quantification</b> Method Referencing Scales Instruments	<b>Quantification</b> Standard method Terms Measure
<b>Numeracy</b>	<b>Numeracy</b>
<b>Communication</b> Spelling (excellence) Technology Variety	<b>Communication skills</b> Oral Written Visual
<b>Interdisciplinary and Interpersonal teamwork</b> Participation Teamwork Leadership	<b>Personal and Interpersonal skills</b> Self confidence Team Innovative solutions Marketing and negotiation skills
<b>Commerce, entrepreneurship and Management</b> Skills Cost Certification Safety Clients needs Environment etc.	<b>Business and Management</b> Cost Quality Client needs Accounting Fees Economic principles
<b>Professional Practice</b> The Acts on professions Laws regulating professions Rules on ethics Practice administration	<b>Professional Practice</b> Significance of Property Legal liabilities Ethics Multi-discipline Rules
<b>Information Technology</b> Use with competence Relevant software Management packages Communication systems	<b>Construction Technology</b> Technologies Sequencing Materials Design Principles Science Site surveying Specifications
<b>Technology</b> Buildability Elements Components Materials Techniques Interpretation Documentation	<b>Construction Technology</b> Technologies Sequencing Materials Design Principles Science Site surveying Specifications
<b>Law</b> Legal concepts Public law Private law	<b>Construction Law and Regulations</b> Knowledge of contracts
<b>Research</b> Identify problems Formulate hypotheses Method Conclusions Recording methods	
<b>(SAQA, 2002)</b>	<b>(PAQS, Education Workshop, 2003)</b>

## MANAGING MOTIVATION

Once the model techniques and competencies of Quantity Surveyors are established, these services must be available to the market through individuals and firms which have the pro-active drive and motivation to satisfy the market needs. Different teams are motivated by different incentives. Some are motivated by a rigid, military regime, employing autocratic motivational tools, while other teams thrive within a civilian environment

Eypôr Arnalds (NORDNET, 1997) argues that the difference can be expressed in musical terms. Some teams may be motivated by strong organisational structures, as is the case with classical music, while other teams tend to be stimulated by a structure comparable with improvisational jazz

There is, however, a universal set of rules that assists teams towards the attainment of quality and success, including the following:

- ❖ Building teams that work
- ❖ Spreading responsibility
- ❖ Following leadership
- ❖ Acknowledging team success; praise is oxygen
- ❖ Concentrating on goals and vision, not on problems (Arnalds, NORDNET, 1997)

Arguably, various rules may apply, but nevertheless, those outlined above provide a sound foundation for potential team success. The following factors also influence the creation of quality driven, empowered teams and deserve mention:

- ❖ The client's idea of quality and value
- ❖ Diverse team structures
- ❖ Upliftment and affirmative action within communities client support during project creation
- ❖ Worker and team values (meaningful work, dignity, personal worth)
- ❖ Productivity heightened by team/worker interaction
- ❖ Delegation of function by project managers (design, cost management, procurement)
- ❖ Shared goals and vision

Motivation is therefore not a product of emotions, but a product of sound planning and management

Managers induce motivation by adhering to the rules, principles and factors that motivate others. Motivated teams are goal-driven to achieve product success and quality (Kezsbom, NORDNET, 1997)

## SUMMARY

### THE QUANTITY SURVEYOR OF THE FUTURE

The foundation of quality in professional service lies in the acceptance and implementation of a value system. The professions allied to the construction industry cannot afford to neglect those values since it is through their application that quality is achieved. Moral and ethical values are intrinsic to quality products

To conclude, the following statements regarding value are significant:

- ❖ The management of quality is crucial to company survival and merits the personal attention and commitment of executive management
- ❖ The primary responsibility lies with those who perform the work required (design, procurement, execution)
- ❖ To enable production teams to accept responsibility for quality output, management must establish systems for control and verification of that output and must educate and train the workforce in the execution of duty (Figure 8)
- ❖ The cost of education and training in techniques and functions to achieve quality standards, will be repaid many times over by greater output, less waste, an improved product and higher profits (Figure 9)
- ❖ Real long term value is the summation of professional and pro-active management of all the influences related to project success in terms of long- and short term value

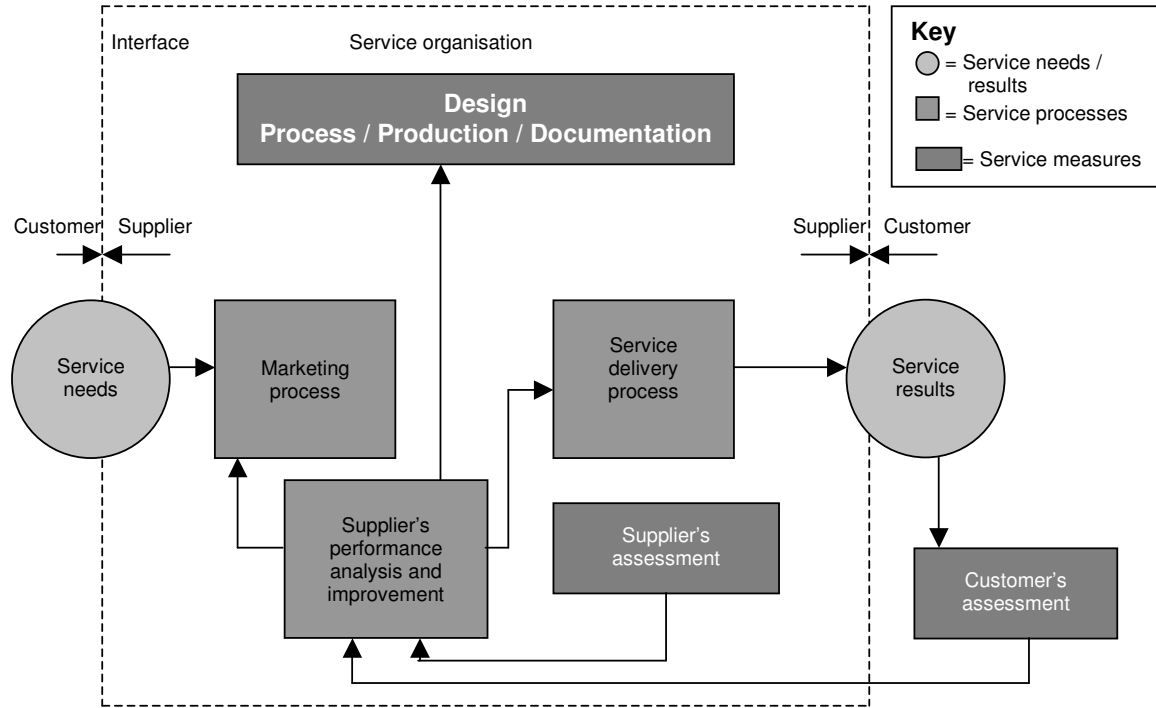


Figure 8 Quality management loop from ISO 9004-2 (Barrett, 1995:10)

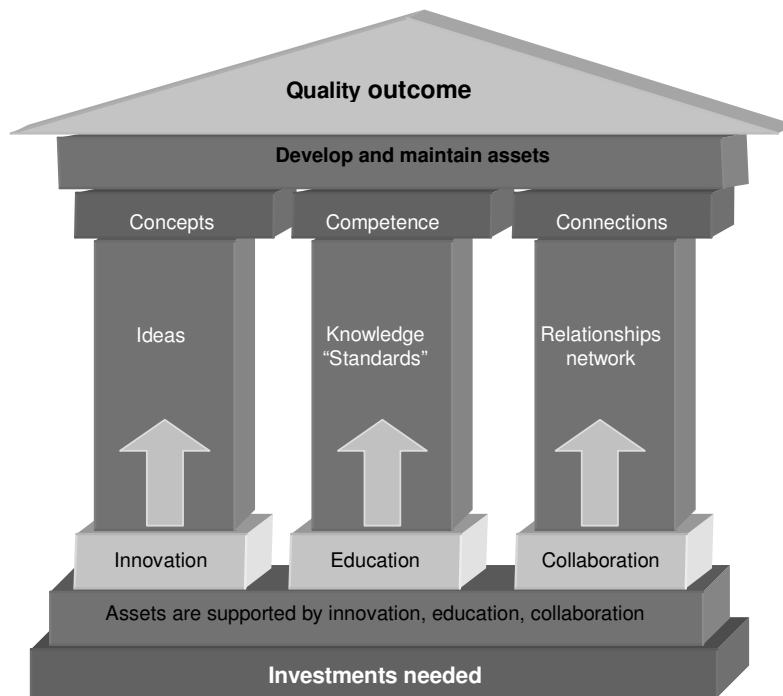


Figure 9 Strategies towards quality outcome

The foregoing factors are not the only attributes influencing project success, they are extremely important and play a major role in the achievement of value (see Barrett, 1995:11)

Quality results not only form a set of rules, they result from a team's commitment and drive, utilising sound principles in achieving set goals and vision. If the Quantity Surveyor pro-actively focuses on quality and value, utilising all the functions, techniques and competencies available, the future looks bright.

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